

Statement of
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United States Department of Energy
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Mr. Chairman, Senator Domenici, and Members of the Subcommittee, it is a pleasure to be here to discuss the Fiscal Year (FY) 2003 budget submission for DOE's Office of Nuclear Energy, Science and Technology.

The Office of Nuclear Energy, Science and Technology (NE) is responsible for leading the Federal government's investment in nuclear science and technology. In FY 2003, we are proposing a \$250 million investment in nuclear R&D and in the Nation's nuclear science, technology, and education infrastructure. This funding provides the stimulus needed to build on the important work begun over the last year in response to the National Energy Policy and represents a major shift in focus and priority for the government's nuclear energy program as we increase our efforts to deploy new nuclear plants in the United States as a key element of long-term energy security.

NUCLEAR ENERGY KEY TO ENERGY SECURITY, CLIMATE STRATEGY

The National Energy Policy underscores the important role of nuclear energy in today's electricity market. Nuclear energy provides 20 percent of electricity supplied in the United States without producing harmful air emissions. Over the last decade, nuclear power has been a success story for the country, providing the most reliable and efficient sources of electricity available on the grid today. The Nation's 103 operating nuclear power plants had another record generating year in 2001, averaging 88.12 percent gross capacity, one percentage point higher than the year before, and operating at an average cost of less than two cents per kilowatt-hour. The improvement in gross capacity is equivalent of adding another twenty-three 1,000 megawatt power plants to the grid over the last decade. Operation of the Nation's existing nuclear power plants avoids carbon emissions on the order of 175 million metric tons annually.

Nuclear energy is important to the President's major new initiative on clean air and climate change. With a target of cutting power plant emissions, including greenhouse gas emissions, by 18 percent over the next ten years, expanded use of nuclear energy and the *Nuclear Power 2010* program will be a key element of our strategy to achieve the President's objectives.

Over the last five years there has been a strong market for purchase of nuclear power plants by nuclear generation companies. This has resulted in a core group of utilities with experience and resources to operate nuclear power plants in the most safe, efficient and effective manner. Industry has successfully moved forward with plant relicensing, with eight units approved, another 15 that have filed application for license renewal, and three that have announced plans to

file in 2002. Today, there is broad agreement that most, if not all, of the currently operating nuclear plants will extend their licenses another 20 years.

Despite these successes, there are still no new plants being built in the United States and there remain barriers that make it difficult for a utility to invest in a new plant. These barriers are what define the role of government and are the focus of our nuclear energy R&D efforts. Removing institutional and technical barriers to both near-term and longer-term expansion of nuclear energy for U.S. energy security is the foundation of this Administration's nuclear R&D program.

Important progress is being made. President Bush recently notified the Congress that he considers Yucca Mountain suitable as a geologic repository for commercial spent fuel and high level waste and qualified for a construction permit application. This is a significant step forward in addressing waste disposal, an important consideration to nuclear energy's future.

There is also strong and visible leadership within the Federal Government in nuclear energy technology and policy. This is essential to the expansion of nuclear energy in the U.S. and abroad and has assured U.S. participation in key international policy discussions on future technologies and nuclear non-proliferation.

EMPHASIS ON NEAR-TERM PROGRESS

In fiscal year 2003, we are proposing \$71.5 million for research and development. Included in the request, are \$46.5 million for the *Nuclear Energy Technologies* program and \$25 million for the *Nuclear Energy Research Initiative*. The Nuclear Energy Technologies program contains two components -- *Nuclear Power 2010* and *Generation IV* -- focused on deploying new nuclear plants by the end of the decade and on developing the next generation of advanced reactor and fuel cycle technologies.

DOE proposes to invest \$38.5 million in FY 2003 on the *Nuclear Power 2010* initiative to collaborate with industry to explore sites that could host new nuclear plants, to demonstrate the essential but untested Nuclear Regulatory Commission (NRC) regulatory processes for site permits and combined construction/operating licenses, and to conduct research to bring the most advanced technologies, such as gas cooled reactors, to the electricity market. We have set an ambitious goal but one we believe is achievable.

In FY 2002, with \$8 million allocated to near term deployment efforts, we are working with industry to explore a range of potential sites. In response to a solicitation by the Department, two major nuclear utilities were awarded funds for cost-shared scoping studies of the efforts required to complete and submit an Early Site Permit (ESP) application to the NRC. These studies will consider privately-owned sites as well as several DOE sites. We recently issued a solicitation for proposals to share in the cost of selecting sites in this country for new nuclear plants and for submitting formal applications to the NRC for early site permit approval -- this is an important first step in demonstrating the NRC's licensing and evaluation process. Successful

demonstration of the NRC's licensing and evaluation process will remove a major risk for utilities' future investments in new nuclear power plants.

At the requested level in FY 2003, we would co-fund with industry completion of three ESP applications and initiate cost-shared reactor technology development activities for one advanced light water reactor and one gas cooled reactor technologies with industry teams led by power generation companies. The objective of the reactor technology development activities is the preparation and submission of Combined Operating License applications to NRC and a decision by industry to initiate construction of new nuclear power plants in the U.S. by 2005.

COMMITTED TO LONG-TERM SAFETY AND SECURITY

In FY 2001, the Department launched the *Generation IV* initiative aimed at development of the next generation of advanced reactor and fuel cycle technologies that can be made available to the market after the end of the decade but before 2030. These are technologies that offer significant advances toward challenging sustainability, safety and reliability and economics goals such that technologies will be competitive in all markets. Generation IV systems include water cooled, gas cooled and liquid metal cooled concepts and non-classical concepts such as reactors with liquid and gaseous cores or concepts featuring novel energy conversion systems. The goals of the Generation IV program were developed by the Department's Nuclear Energy Research Advisory Committee (NERAC) and endorsed by the international community.

In FY 2001, we led the formation of the Generation IV International Forum (GIF), an international collective of ten leading nuclear nations to work in joint cooperation on developing Generation IV technologies on a multilateral basis and to address the expansion of nuclear energy globally. A formal GIF charter was signed in July by the representatives of the nations of Argentina, Brazil, Canada, France, Japan, Republic of Korea, Republic of South Africa, the United Kingdom and the United States. Since then, Switzerland has also joined the GIF.

The Department is leading the development of the Generation IV Technology Roadmap with the GIF, which when complete in early FY 2003 will identify the six to eight most promising nuclear reactor and fuel cycle concepts. The Technology Roadmap will identify the R&D necessary to advance these concepts to the point of maturity for potential commercialization by the private sector. The long-term R&D will be conducted in cost-shared cooperation with other GIF member countries providing a high degree of financial leveraging of R&D funding. The Department proposes to double the funding to \$8 million in FY 2003 to continue the *Generation IV* initiative.

INTERNATIONAL PARTNERSHIPS IN NUCLEAR DEVELOPMENT

The Department will also continue to fund investigator-initiated, peer reviewed R&D under the Nuclear Energy Research Initiative (NERI). Started in 1999, this program is the cornerstone on which the Federal government's nuclear R&D initiatives have been built. It has helped return the

U.S. to a key leadership role in international exploration of nuclear energy. While still early in the life of this program, NERI has achieved considerable success. It was the birthing place for what is now *Generation IV*, and it has helped re-energize nuclear R&D at U.S. universities, laboratories and industry. The Department is requesting \$25 million in FY 2003 for the NERI program.

Forty-three NERI projects started in previous years will be completed this year. Ten projects will continue and twenty-three new awards will be made. Hopefully, as part of the FY 2002 awards, there will be more research initiated in the application of nuclear energy as a clean air alternative for producing hydrogen for the transportation sector and other applications. In FY 2003, we will continue to fund the ongoing projects.

Last year, we launched the International-NERI program to promote international collaborative research focused on the development of advanced technologies and we signed bilateral agreements with France and the Republic of Korea. Three collaborative research projects with France were initiated and this year, six have been initiated with the Republic of Korea. Discussions with Japan, the Republic of South Africa and the Nuclear Energy Agency are expected to lead to bilateral agreements being established this fiscal year that will result in an additional three to five co-funded research projects. In FY 2003, we will continue the research projects that started over the last two years.

In FY 2003, the Department has included no funds for the Nuclear Energy Plant Optimization (NEPO) program or for the Advanced Nuclear Medicine Initiative (ANMI). The NEPO program was established in FY 2000 as a cost-shared effort with industry to address plant aging and development of technologies that improve the reliability and availability of the fleet of existing nuclear power plants in order to aid plant recertification. The ANMI program was started with \$2.5 million and funds nine research grants and five educational grants to post secondary institutions. The ANMI grants, awarded on a peer review basis for a term of three years, will be completed in FY 2003 with funds remaining from FY 2002. While the Department believes some of the objectives of both of these programs may have merit, many of their objectives -- such as nuclear plant recertification -- are being achieved, and the request reflects the need to fund higher priorities within the Department.

The FY 2003 request would allocate \$17.5 million in funding to train and prepare the next generation of nuclear scientists and engineers. Among the activities of the University Reactor Fuel Assistance and Support program, we provide fresh fuel to university research reactors; receive spent fuel; provide industry matching grants to 25 participating universities; provide scholarships and fellowships to outstanding undergraduates and graduate students; fund peer-reviewed nuclear engineering research; and fund radiochemistry student fellowships. With the support of Congress, the funding for this program has increased significantly over the last several years, and we propose to fund it at the same increased level of funding appropriated last year.

With additional funding appropriated by Congress in FY 2002, we are launching the *Innovations in Nuclear Infrastructure and Education* initiative to establish regional research centers for U.S. university nuclear engineering programs. This initiative, structured to promote partnerships among universities, national laboratories, and the private sector, follows through on a specific recommendation of the NERAC and on direction of Congress. Under this initiative, we will provide assistance to universities on a merit and peer reviewed basis that could be used to improve the reactors, to maintain qualified reactor staff, and to better integrate the use of these facilities with university nuclear engineering programs.

The FY 2003 budget request fully integrates all of the Department's advanced research related to processing of spent fuel and transmutation into a single program -- Spent Fuel Processing and Transmutation. The program has evolved significantly over the last several years and consistent with the direction provided by Congress as part of the FY 2002 Appropriations Conference Report, we are now in the process of combining the technology activities based at the Argonne National Laboratory in Chicago, Illinois, the Los Alamos National Laboratory in New Mexico, the Oak Ridge National Laboratory in Tennessee, and the University of Nevada-Las Vegas into a single, integrated program to explore both reactor and accelerator technologies associated with spent fuel processing. We are working very closely with a subcommittee of the NERAC under the leadership of Dr. Burton Richter to create a plan that will describe how we will meet the policy and technology goals envisioned by the National Energy Policy. Once the program integration activities are complete and the plan provided to Congress, we will be in a position to recommend future funding for this program that will meet the aggressive technology goals envisioned by the National Energy Policy.

In the FY 2003 budget request, we will initiate laboratory scale demonstration of Argonne-developed pyroprocessing technologies. Non-fertile fuel is being fabricated this year for future irradiation testing in the Advanced Test Reactor. Also, in FY 2003, 20 graduate students will complete or pursue their graduate degree educations in engineering and scientific disciplines relevant to accelerator technology and transmutation. This fiscal year, following completion of the primary sodium drain, we are achieving a major milestone by completing deactivation of the Experimental Breeder Reactor II. In FY 2002, and proposed in FY 2003, we will treat 0.5 metric tons of sodium-bonded spent nuclear fuel at Argonne National Laboratory-West (ANL-West) in Idaho. The Department is requesting \$18.2 million in FY 2003.

NUCLEAR SCIENCE AND TECHNOLOGY INFRASTRUCTURE

In FY 2003, the Department proposes to consolidate NE's infrastructure spending under a single program, *Radiological Facilities Management*, to maintain critical facilities in a safe, secure and environmentally compliant and cost effective manner to support national priorities funded by industry and other Federal agencies. The \$83 million in funds being requested in FY 2003 will assure the readiness and the operability of these facilities to respond to the range of missions that are funded by DOE, industry, research groups, and other Federal agency users. The Office funds missions at Argonne, the Idaho National Engineering and Environmental Laboratory (INEEL),

Oak Ridge, Los Alamos, the Sandia National Laboratory in New Mexico, Brookhaven National Laboratory on Long Island, New York, Pacific Northwest National Laboratory in Washington, and the Mound Plant in Ohio.

We are requesting \$31.6 million to maintain key facilities, to safely and securely manage special nuclear material, and to deactivate unneeded facilities at ANL-West. We are requesting \$11.2 million for Test Reactor Area at INEEL. The requested increase in funding for Test Reactor Area will enable the Department to address the backlog of preventative and corrective maintenance and to proceed more aggressively to replace aging electrical equipment under an electrical utility upgrade project. This enables us to begin to reverse the decline in the infrastructure at the Test Reactor Area that has occurred over the last several years.

The FY 2003 request includes funding to maintain and operate facilities at Mound that enable the Department to conduct operations associated with DOE's radioisotope power systems. In FY 2002 we will conduct new analyses that examine actions that may be needed to further protect the community and the materials stored at the site from potential security threats, in the context of the September 11, 2001, terrorist attack. The results of these analyses will determine what actions we take at Mound in the future. Until a decision is made on the nature of the actions to be taken, the materials will be moved to an interim location at another site.

The Department will continue to maintain the iridium fabrication facilities at Oak Ridge to support fabrication of radioisotope power systems. These facilities encapsulate and contain the plutonium (Pu)-238 pellets used in the space power systems. The Department will continue to maintain the option to produce Pu-238 domestically to satisfy national security missions. FY 2003 activities will focus on conceptual design activities associated with processing facilities at Oak Ridge, and on supporting activities to move the neptunium-237 from the Savannah River Site in South Carolina to Oak Ridge. DOE plans to produce at least eight iridium cladding sets at Oak Ridge, at least eight encapsulated Pu-238 pellets at Oak Ridge, and process at least two kilograms of Pu-238 through the scrap recovery line at Los Alamos.

Finally, the President's FY 2003 budget request for the National Aeronautics and Space Administration (NASA) proposes a five-year, \$1 billion new *Nuclear Systems Initiative*. In partnership with industry and academia, DOE will develop for NASA technologies that could power missions to the far reaches of the solar system. DOE will develop a new generation of radioisotope power systems to generate electrical power for spacecraft and scientific instruments for missions in deep space and on planetary surfaces. For key NASA science missions, these systems offer enormous advantages over other power options. For example, the capability of a NASA rover to remain operational on the surface of Mars can be increased from a few months to a few years, increasing the science return many times over. Also, DOE will participate in the development of a nuclear fission reactor with an advanced electric propulsion system that would enable spacecraft to make faster trips throughout the solar system, to carry out robust scientific missions, and to visit multiple destinations on the same mission.

The Department is also proceeding with permanent shutdown and deactivation of the Fast Flux Test Facility (FFTF) at the Hanford Site in Washington this fiscal year. Experience gained from the Experimental Breeder Reactor II deactivation is being applied to the deactivation of FFTF, which should result in cost and schedule efficiencies. The Department has proposed \$36.1 million in FY 2003 to continue making progress on deactivation. In the FY 2003 budget request, the Department will validate the fuel handling control systems, reestablish the hot cell operating capabilities, upgrade sodium drain controls, and restore the Sodium Storage Facility.

MEDICAL ISOTOPES FOR RESEARCH AND HEALTH CARE

The remaining funding requested for Radiological Facilities Management is to maintain the infrastructure for production and distribution of isotopes. Although most of our isotopes are for medical research, the Department does provide isotopes for commercial uses that otherwise would not be available. In FY 2001, we served 324 customers located in 20 countries, exceeding 94 percent on-time delivery of 589 shipments. Many of those that were delayed were a result of actions taken by DOE after September 11, 2001, terrorist attack to further assure the safety and security of radiological material shipments.

This year, we are changing the process we apply for producing, distributing, and pricing our research isotopes. A new protocol -- *Nuclear Energy Protocol for Research Isotopes (NEPRI)* -- will guide the selection of isotopes for future development, production, and distribution. A peer review selection process was initiated last month to decide what research isotopes DOE will produce in FY 2003. This process is intended to assure that DOE produces those isotopes that provide the greatest benefit to the research community and the public. Isotopes will be priced such that production costs are paid in advance by the customer.

Over the last several years, DOE has been providing actinium (Ac)-225 for use in cancer research. In FY 2003, DOE will continue to supply the Ac-225 at the level available in FY 2002. However, any future processing of thorium-229 needed to increase the supply of Ac-225 will be financed by the private sector. DOE will issue a request for proposals this year soliciting private sector participation in the production of Ac-225.

The Department is requesting \$24.3 million in FY 2003 for salaries, travel, support services and other administrative expenses and field personnel providing direction to NE programs. Although NERAC members receive no salary, the program direction account also supports the activities of the NERAC.

CONCLUSION

Mr. Chairman, and Members of the Subcommittee, this concludes my prepared statement. I would be pleased to answer any questions you may have.